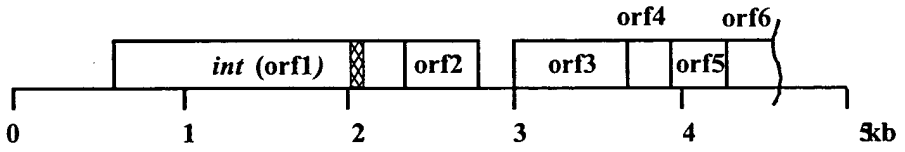
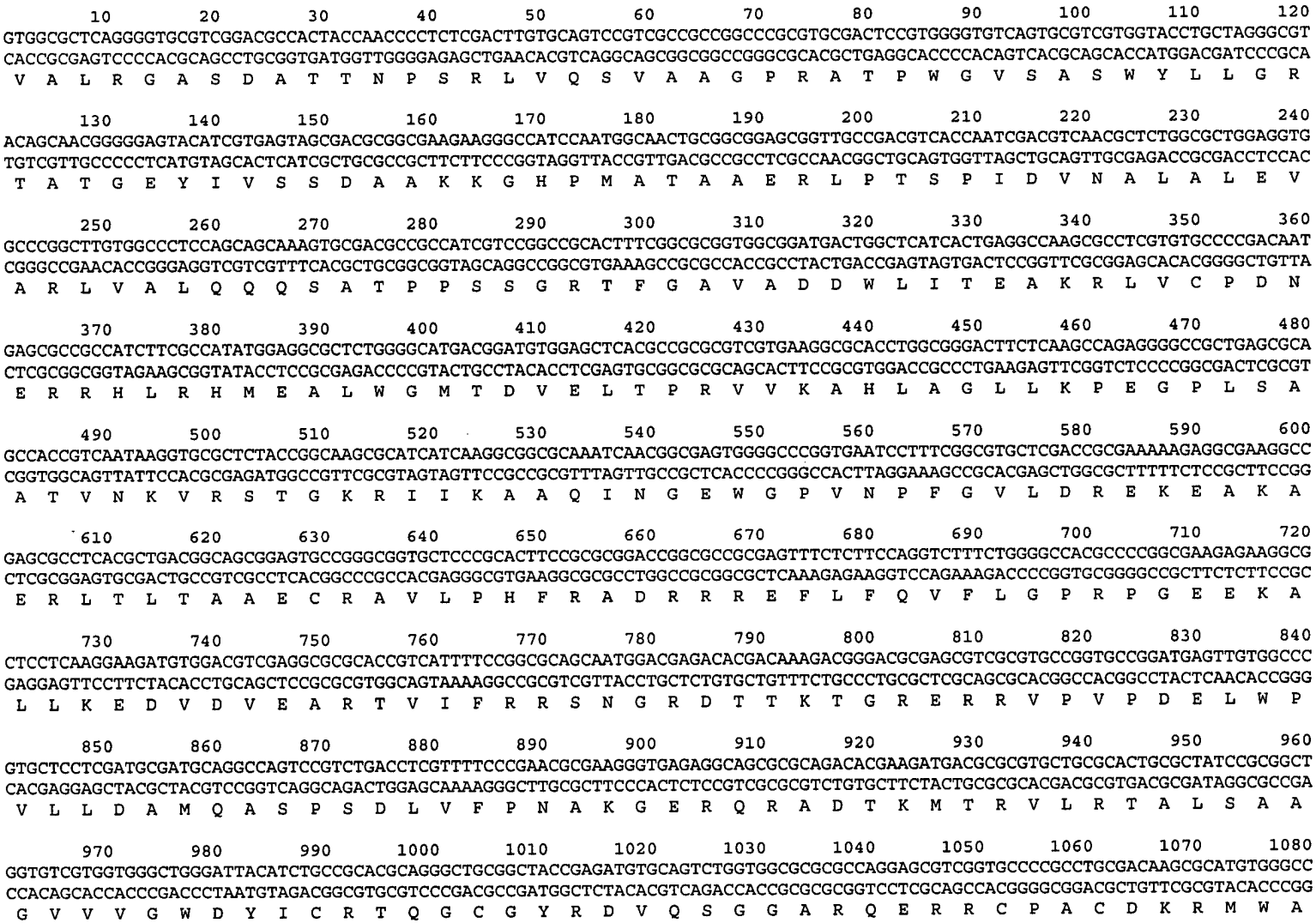


Figure 1

Figure 2



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        1090      1100      1110      1120      1130      1140      1150      1160      1170      1180      1190      1200
AGTGGTCGCCCCAAACCCGCCGTCTGGTACGGGCTCCGTCACACCGCGGCGACACTGCACAGGAAGGCGGGCTGCGACCCGCTCGTCATCAAGCTCGTGCTGGGGCATGCGGCTGTCGAC
TCACCAGCGGGGTTTGGGCGGCAGACCATGCCCGAGGCAGTGTGGCGCCGCTGTGACGTGTCCTTCCGCCCGACGCTGGGCGAGCAGTAGTTCGAGCACGACCCCGTACGCCGACAGCTG
 S  G  R  P  K  P  A  V  W  Y  G  L  R  H  T  A  A  T  L  H  R  K  A  G  C  D  P  L  V  I  K  L  V  L  G  H  A  A  V  D

        1210      1220      1230      1240      1250      1260      1270      1280      1290      1300      1310      1320
ACCACGGACGACGTGTACACGCACCTCGACGAGGACTACTGCCGCGCCGAACTTAACAAGTTGTCGCTGAAGGCCCCGCCGCCACCACCTACTCACCAGGGAGGAAGTGACGGCGGCCCT
TGGTGCCTGCTGCACATGTGCGTGGAGCTGCTCCTGATGACGGCGCGGCTTGAATTGTTCAACAGCGACTTCCGGGGCGGCGGTGGTGGATGAGTGGTCCCTCCTTCACTGCCGCCGGGA
 T  T  D  D  V  Y  T  H  L  D  E  D  Y  C  R  A  E  L  N  K  L  S  L  K  A  P  P  P  P  P  T  H  Q  G  G  S  D  G  G  P

        1330      1340      1350      1360      1370      1380      1390      1400      1410      1420      1430      1440
GACTCAGGACGCAACACCTACGGTGAAGGAGGCACCATGCACGGATTGGGAGATTTGCAGCATCACCGGGCGAGAGCTTGGGAAGCTCGTGCTCTACCAACTGAGCTACCACCGCGGAAC
CTGAGTCCTGCGTTGTGGATGCCACTTCCTCCGTGGTACGTGCCTAACCCTCTAAACGTCGTAGTGGCCCGCTCTCGAACCCTTCGAGCACGAGATGGTTGACTCGATGGTGGCGCCTTG
 D  S  G  R  N  T  Y  G  E  G  G  T  M  H  G  L  G  D  L  Q  H  H  R  A  R  A  W  E  A  R  A  L  P  T  E  L  P  P  R  N
                                                                                 →              ←

        1450      1460      1470      1480      1490      1500      1510      1520      1530      1540      1550      1560
TTGGCCGGGGGTATACCGGCGCCGCTGCTGAGCGTCAAGGACGTTGCGGCTTCACTCTCAGTGAGCACGGCGAAGGTGTACCAGCTCCTCGCCGCCGGCGTCCTGCCTACCGTGTGGGTG
AACCGGCCCCCATATGGCCGCGGCGACGACTCGCAGTTCCTGCAACGCCGAAGTGAGAGTCACTCGTGCCGCTTCCACATGGTCGAGGAGCGGCGGCCGCAGGACGGATGGCACACCCAC
 L  A  G  G  I  P  A  P  L  L  S  V  K  D  V  A  A  S  L  S  V  S  T  A  K  V  Y  Q  L  L  A  A  G  V  L  P  T  V  W  V

        1570      1580      1590      1600      1610      1620      1630      1640
GGCCAGTCGCGCCGCGTCAAGCGTGAGGACCTGGACGCCTACATCGCCCGCGCGACGGCCACCGGCGGGAAGCGGGGTGGCAAATGA
CCGGTCAGCGCGGCGCAGTTCGCACTCCTGGACCTGCGGATGTAGCGGGCGCGCTGCCGGTGGCCGCCCTTCGCCCCACCGTTTACT
 G  Q  S  R  R  V  K  R  E  D  L  D  A  Y  I  A  R  A  T  A  T  G  G  K  R  G  G  K  *
```

Figure 3

A.

10 20 30 40 50 60 70 80 90 100 110 120
GTGAGCTGACCTCAACGGTTTGTTGGGTGGGGAGCGGGACAGCGGACCACATGGTGCCAGGGCTTACGGCTTCGCACACGGGGCTGGGCGATGCTGAACGGAGCGTCCCATGTCCACGCG
CACTCGACTGGAGTTGCCAAACAACCCACCCCTCGCCCTGTCGCCTGGTGTACCACGGTCCCGAATGCCGAAGCGTGTGCCCCGACCCGCTACGACTTGCCTCGCAGGGTACAGGTGCGC

130 140 150 160 170 180 190 200 210 220 230 240
ATGCCGCCTGGCTTGCACATAGGGATTCGAAACCTCGACCCC**GAGCTTGGGAAGCTCGTGCTCTACCAACTGAGCTACCACCGC**AGGCGAAGCAGGGCGCAAAGTACGGGCCGCCCTGTG
TACGGCGGACCGAACGTGTATCCCTAAGCTTTGGAGCTGGGG**CTCGAACCCTTCGAGCACGAGATGGTTGACTCGATGGTGGCG**TCCGCTTCGTCCCGCGTTTCATGCCCGGCGGGACAC

250 260 270 280 290 300 310 320 330 340 350 360
GCTTGTCAACGGGAAGTGAGGTGCTACTCCGTCTCCTCGACGGTGAGCTGGTACGAGTCCTGGAAGTTGGACTCGCGGTTGCGCGCGTCCCGGACCTCGAAGAGGTAGACGCCTGGCTCG
CGAACAGTTGCCCTTCACTCCACGATGAGGCAGAGGAGCTGCCACTCGACCATGCTCAGGACCTTCAACCTGAGCGCCAACGCGCGCAGGGCCTGGAGCTTCTCCATCTGCGGACCGAGC

B.

10 20 30 40 50 60 70 80 90 100 110 120
CGAGCCGGGGACGGGAGCGGCGGGACCGGCTTCGCGCCGTTTACAGCATCCTTGCTGCAAGACGCCCCGAGGCCCGAAAAGACGAAGGCCGGCAGTCCCGAGTTTCCTCAAGGACTACCG
GCTCGGCCCCTGCCCTCGCCGCCCTGGCCGAAGCGCGGCAAATGTCGTAGGAACGACGTTCTGCGGGGCTCCGGGCTTTTCTGCTTCCGGCCGTCAGGGCTCAAAGGAGTTCCTGATGGC

130 140 150 160 170 180 190 200 210 220 230 240
GCCTTCATGGGTGAGCGGCGGAAGGGATTCGAACCCTCGACCCC**GAGCTTGGGAAGCTCGTGCTCTACCAACTGAGCTACCACCGC**AGGCGAAGCAGGGCGCAAAGTACGGGCCGCCCTG
CGGAAGTACCCACTCGCCGCCTTCCCTAAGCTTGGGAGCTGGGG**CTCGAACCCTTCGAGCACGAGATGGTTGACTCGATGGTGGCG**TCCGCTTCGTCCCGCGTTTCATGCCCGGCGGGAC
→ ←

250 260 270 280 290 300 310 320 330 340 350 360
TGGCTTGTCAACGGGAAGTGAGGTGCTACTCCGTCTCCTCGACGGTGAGCTGGTACGAGTCCTGGAAGTTGGACTCGCGGTTGCGCGCGTCCCGGACCTCGAAGAGGTAGACGCCTGGCT
ACCGAACAGTTGCCCTTCACTCCACGATGAGGCAGAGGAGCTGCCACTCGACCATGCTCAGGACCTTCAACCTGAGCGCCAACGCGCGCAGGGCCTGGAGCTTCTCCATCTGCGGACCGA

C.

10 20 30 40 50 60 70 80 90 100 110 120
TGCCAGGGCTTACGGCTTCGCACACGGGGCTGGGCGATGCTGAACGGAGCGTCCCATGTCCACGCGATGCCGCCTGGCTTGCACATAGGGATTCGAAACCTCGACCCC**GAGCTTGGGAAG**
ACGGTCCCGAATGCCGAAGCGTGTGCCCCGACCCGCTACGACTTGCCTCGCAGGGTACAGGTGCGCTACGGCGGACCGAACGTGTATCCCTAAGCTTTGGAGCTGGGG**CTCGAACCCTTC**

130 140 150 160 170 180 190 200 210 220 230 240
CTCGGCCTCGACCCGTCCAGGCGTTATCAGCCGTTCGCAAACCCTTACTTCGCCTTGGGGATTCCGGGCCGGGGGCCTGTCCATCCGTCGCAGCGGGTAGCAGGGAGTCTCAGGGGGGTT
GAGCCGGAGCTGGGCAGGTCCGCAATAGTCGGCAAGCGTTTGGGAATGAAGCGGAACCCCTAAGGCCCGGCCCCCGGACAGGTAGGCAGCGTCGCCCATCGTCCCTCAGAGTCCCCCCAA

D.

10 20 30 40 50 60 70 80 90 100 110 120
CGCCACCACCTACTCACCAGGGAGGAAGTGACGGCGGCCCTGACTCAGGACGCAACACCTACGGTGAAGGAGGCACCATGCACGGATTGGGAGATTTGCAGCATCACCGGGCGA**GAGCTT**
GCGGTGGTGGATGAGTGGTCCCTCCTTCACTGCCGCCGGGACTGAGTCCTGCGTTGTGGATGCCACTTCCTCCGTGGTACGTGCCTAACCCTCTAAACGTCGTAGTGGCCCGCT**CTCGAA**

130 140 150 160 170 180 190 200 210 220 230 240
GGGAAGCTCGTGCTCTACCAACTGAGCTACCACCGCGGAACTTGGCCGGGGGTATACCGGCGCCGCTGCTGAGCGTCAAGGACGTTGCGGCTTCACTCTCAGTGAGCACGGCGAAGGTGT
CCCTTCGAGCACGAGATGGTTGACTCGATGGTGGCGCCTTGAACCGGCCCCCATATGGCCGCGGCGACGACTCGCAGTTCCTGCAACGCCGAAGTGAGAGTCACTCGTGCCGCTTCCACA
→ ←

250
ACCAGCTCCTCGCCGCC
TGGTCGAGGAGCGGCGG

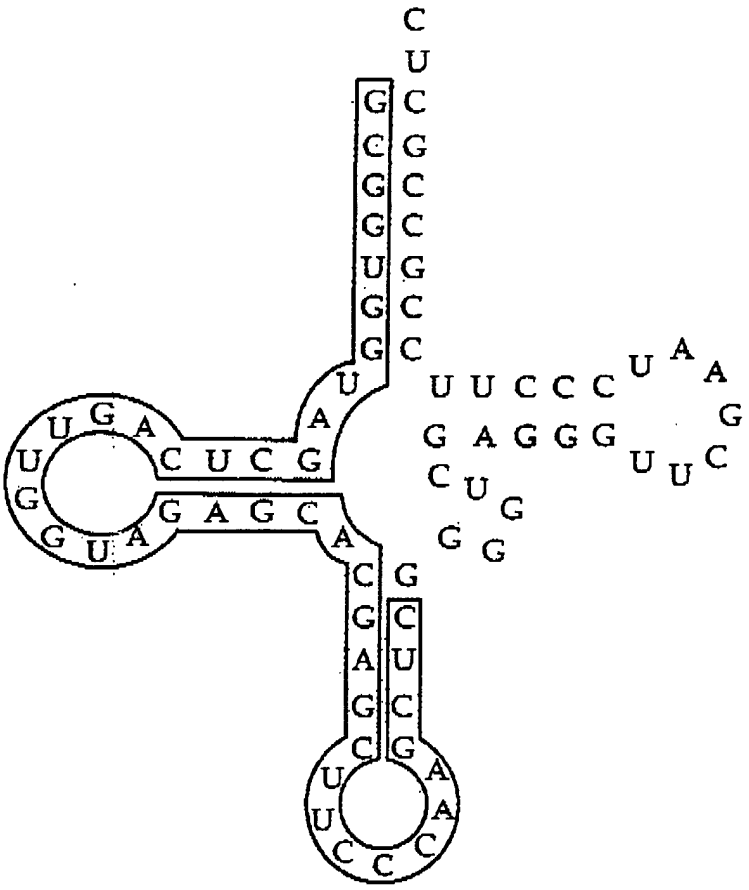

Figure 4

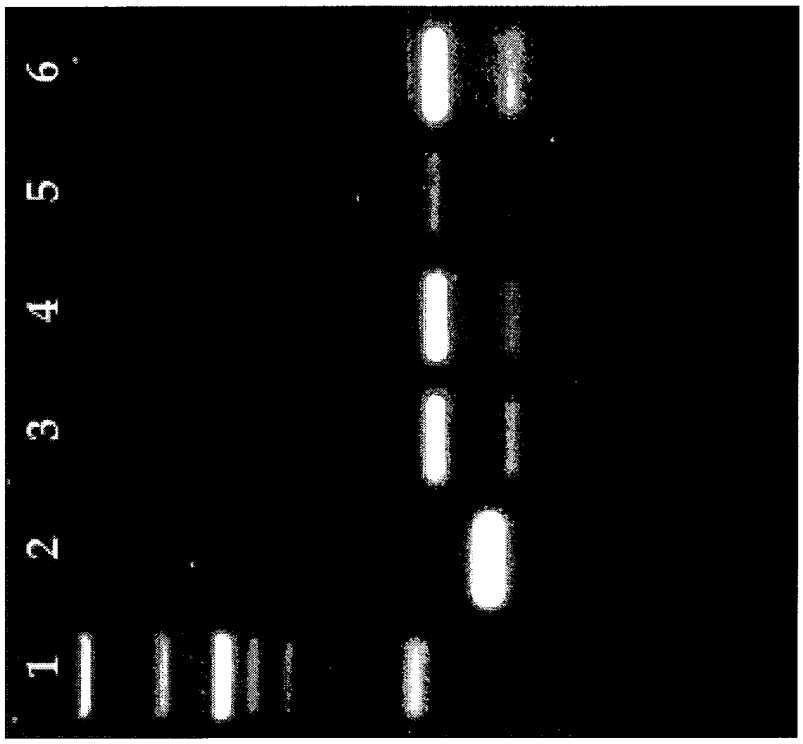

FIGURE 5

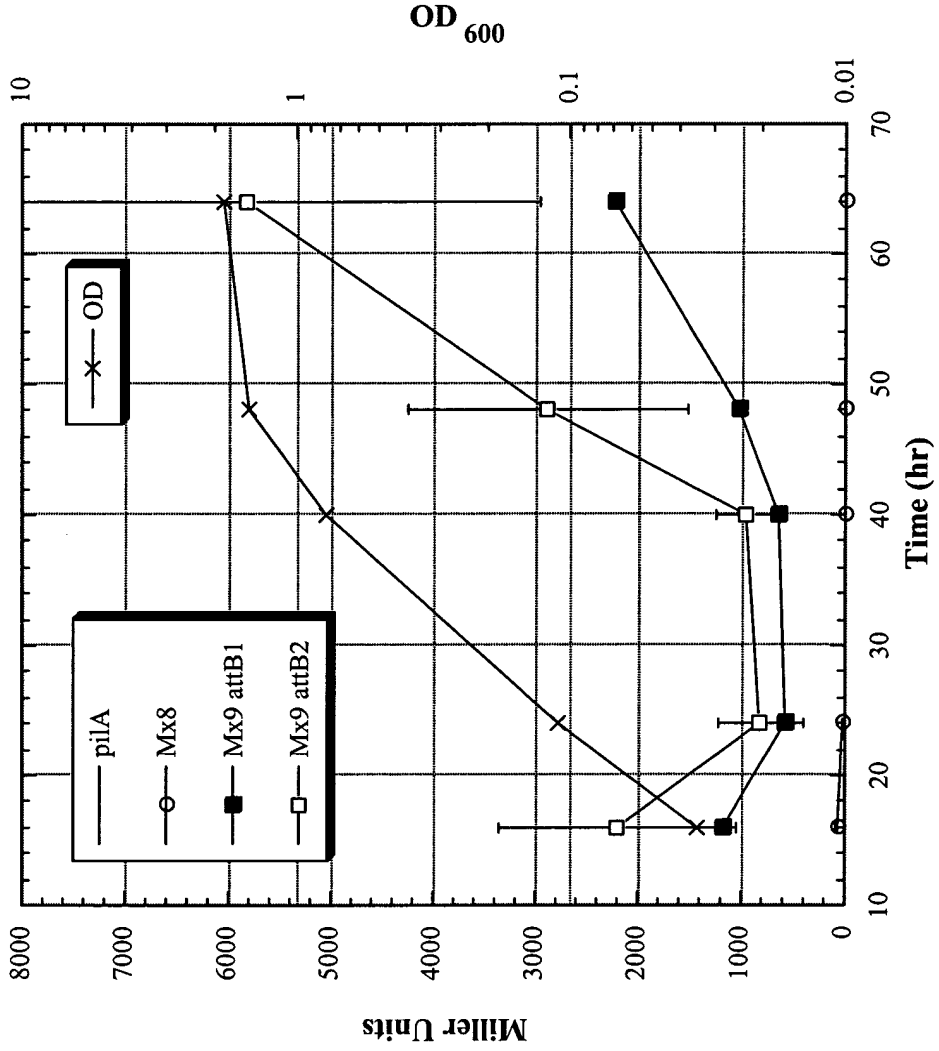
OD 600
10
1
0.1
0.01
OD
pilA
Mx8
Mx9 attB1
Mx9 attB2
Miller Units
8000
7000
6000
5000
4000
3000
2000
1000
0
Time (hr)
10
20
30
40
50
60
70

FIGURE 6A

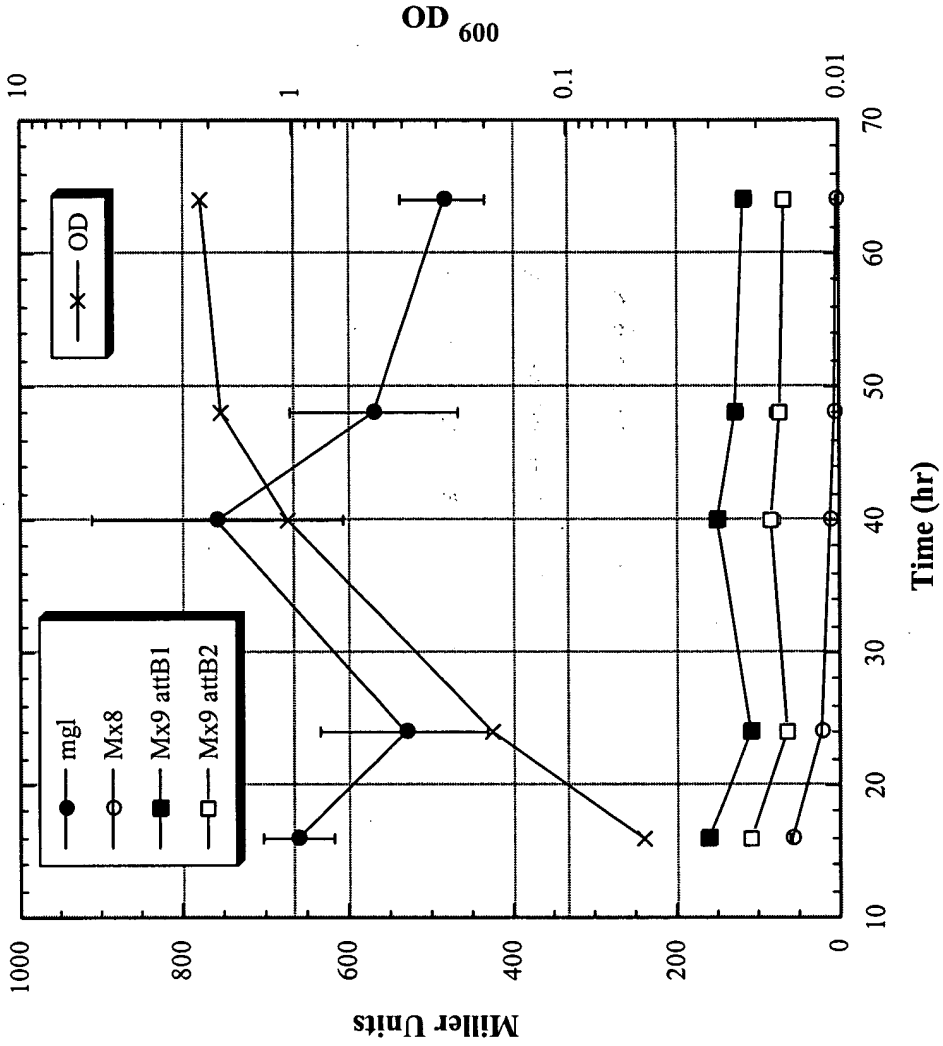
OD 600
10
1
0.1
0.01
OD
mgl
Mx8
Mx9 attB1
Mx9 attB2
1000
800
600
400
200
0
Miller Units
10
20
30
40
50
60
70
Time (hr)

FIGURE 6B

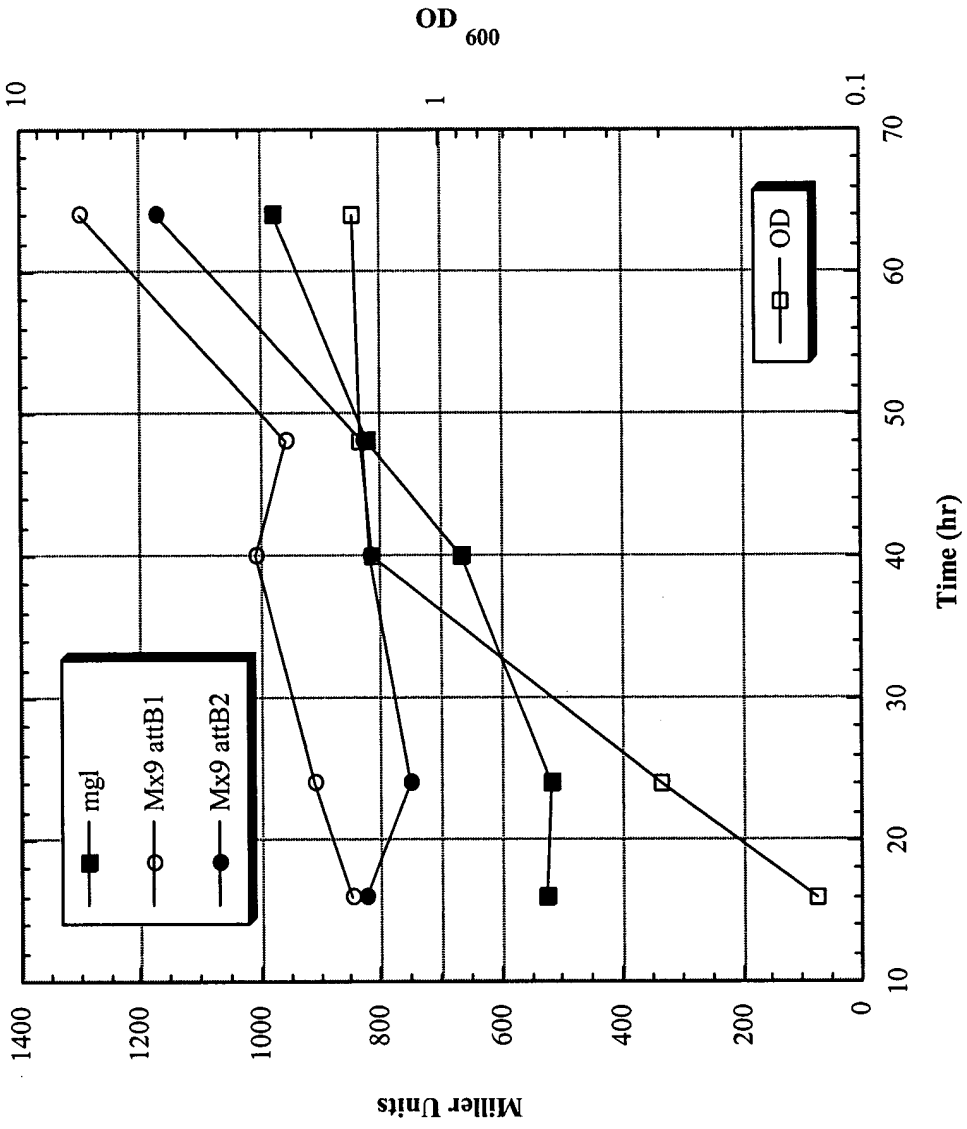
OD 600
10
1
0.1
70
60
50
40
30
20
10
Time (hr)
OD
mgl
Mx9 attB1
Mx9 attB2
1400
1200
1000
800
600
400
200
0
Miller Units

FIGURE 6C

Figure 7

```
    10          20          30          40          50          60
ATG GAA AAA AAG GAA TTT CGT GTT TTG ATA AAA TAC TGT TTT CTG AAG GGA AAA AAT ACA
TAC CTT TTT TTC CTT AAA GCA CAA AAC TAT TTT ATG ACA AAA GAC TTC CCT TTT TTA TGT
Met Glu Lys Lys Glu Asn Arg Val Leu Ile Lys Tyr Cys Asn Leu Lys Gly Lys Asn Thr

          70          80          90          100         110         120
GTG GAA GCA AAA ACT TGG CTT GAT AAT GAG TTT CCG GAC TCT GCC CCA GGG AAA TCA ACA
CAC CTT CGT TTT TGA ACC GAA CTA TTA CTC AAA GGC CTG AGA CGG GGT CCC TTT AGT TGT
Val Glu Ala Lys Thr Trp Leu Asp Asn Glu Asn Pro Asp Ser Ala Pro Gly Lys Ser Thr

          130         140         150         160         170         180
ATA ATT GAT TGG TAT GCA AAA TTC AAG CGT GGT GAA ATG AGC ACG GAG GAC GGT GAA CGC
TAT TAA CTA ACC ATA CGT TTT AAG TTC GCA CCA CTT TAC TCG TGC CTC CTG CCA CTT GCG
Ile Ile Asp Trp Tyr Ala Lys Phe Lys Arg Gly Glu Met Ser Thr Glu Asp Gly Glu Arg

          190         200         210         220         230         240
AGT GGA CGC CCG AAA GAG GTG GTT ACC GAC GAA AAC ATC AAA AAA ATC CAC AAA ATG ATT
TCA CCT GCG GGC TTT CTC CAC CAA TGG CTG CTT TTG TAG TTT TTT TAG GTG TTT TAC TAA
Ser Gly Arg Pro Lys Glu Val Val Thr Asp Glu Asn Ile Lys Lys Ile His Lys Met Ile

          250         260         270         280         290         300
TTG AAT GAC CGT AAA ATG AAG TTG ATC GAG ATA GCA GAG GCC TTA AAG ATA TCA AAG GAA
AAC TTA CTG GCA TTT TAC TTC AAC TAG CTC TAT CGT CTC CGG AAT TTC TAT AGT TTC CTT
Leu Asn Asp Arg Lys Met Lys Leu Ile Glu Ile Ala Glu Ala Leu Lys Ile Ser Lys Glu

          310         320         330         340         350         360
CGT GTT GGT CAT ATC ATT CAT CAA TAT TTG GAT ATG CGG AAG CTC TGT GCA AAA TGG GTG
GCA CAA CCA GTA TAG TAA GTA GTT ATA AAC CTA TAC GCC TTC GAG ACA CGT TTT ACC CAC
Arg Val Gly His Ile Ile His Gln Tyr Leu Asp Met Arg Lys Leu Cys Ala Lys Trp Val

          370         380         390         400         410         420
CCG CGC GAG CTC ACA TTT GAC CAA AAA CAA CAA CGT GTT GAT GAT TCT GAG CGG TGT TTG
GGC GCG CTC GAG TGT AAA CTG GTT TTT GTT GTT GCA CAA CTA CTA AGA CTC GCC ACA AAC
Pro Arg Glu Leu Thr Asn Asp Gln Lys Gln Gln Arg Val Asp Asp Ser Glu Arg Cys Leu

          430         440         450         460         470         480
CAG CTG TTA ACT CGT AAT ACA CCC GAG TTT TTC CGT CGA TAT GTG ACA ATG GAT GAA ACA
GTC GAC AAT TGA GCA TTA TGT GGG CTC AAA AAG GCA GCT ATA CAC TGT TAC CTA CTT TGT
Gln Leu Leu Thr Arg Asn Thr Pro Glu Asn Phe Arg Arg Tyr Val Thr Met Asp Glu Thr

          490         500         510         520         530         540
TGG CTC CAT CAC TAC ACT CCT GAG TCC AAT CGA CAG TCG GCT GAG TGG ACA GCG ACC GGT
ACC GAG GTA GTG ATG TGA GGA CTC AGG TTA GCT GTC AGC CGA CTC ACC TGT CGC TGG CCA
Trp Leu His His Tyr Thr Pro Glu Ser Asn Arg Gln Ser Ala Glu Trp Thr Ala Thr Gly

          550         560         570         580         590         600
GAA CCG TCT CCG AAG CGT GGA AAG ACT CAA AAG TCC GCT GGC AAA GTA ATG GCC TCT GTT
CTT GGC AGA GGC TTC GCA CCT TTC TGA GTT TTC AGG CGA CCG TTT CAT TAC CGG AGA CAA
Glu Pro Ser Pro Lys Arg Gly Lys Thr Gln Lys Ser Ala Gly Lys Val Met Ala Ser Val
```

```
          610         620         630         640         650         660
TTT TTC GAT GCG CAT GGA ATA ATT TTT ATC GAT TAT CTT GAG AAG GGA AAA ACC ATC AAC
AAA AAG CTA CGC GTA CCT TAT TAA AAA TAG CTA ATA GAA CTC TTC CCT TTT TGG TAG TTG
Asn Phe Asp Ala His Gly Ile Ile Asn Ile Asp Tyr Leu Glu Lys Gly Lys Thr Ile Asn

          670         680         690         700         710         720
AGT GAC TAT TAT ATG GCG TTA TTG GAG CGT TTG AAG GTC GAA ATC GCG GCA AAA CGG CCC
TCA CTG ATA ATA TAC CGC AAT AAC CTC GCA AAC TTC CAG CTT TAG CGC CGT TTT GCC GGG
Ser Asp Tyr Tyr Met Ala Leu Leu Glu Arg Leu Lys Val Glu Ile Ala Ala Lys Arg Pro

          730         740         750         760         770         780
CAT ATG AAG AAG AAA AAA GTG TTG TTC CAC CAA GAC AAC GCA CCG TGC CAC AAG TCA TTG
GTA TAC TTC TTC TTT TTT CAC AAC AAG GTG GTT CTG TTG CGT GGC ACG GTG TTC AGT AAC
His Met Lys Lys Lys Lys Val Leu Phe His Gln Asp Asn Ala Pro Cys His Lys Ser Leu

          790         800         810         820         830         840
AGA ACG ATG GCA AAA ATT CAT GAA TTG GGC TTC GAA TTG CTT CCC CAC CCA CCG TAT TCT
TCT TGC TAC CGT TTT TAA GTA CTT AAC CCG AAG CTT AAC GAA GGG GTG GGT GGC ATA AGA
Arg Thr Met Ala Lys Ile His Glu Leu Gly Phe Glu Leu Leu Pro His Pro Pro Tyr Ser

          850         860         870         880         890         900
CCA GAT CTG GCC CCC AGC GAC TTT TTC TTG TTC TCA GAC CTC AAA AGG ATG CTC GCA GGG
GGT CTA GAC CGG GGG TCG CTG AAA AAG AAC AAG AGT CTG GAG TTT TCC TAC GAG CGT CCC
Pro Asp Leu Ala Pro Ser Asp Asn Phe Leu Phe Ser Asp Leu Lys Arg Met Leu Ala Gly

          910         920         930         940         950         960
AAA AAA TTT GGC TGC AAT GAA GAG GTG ATC GCC GAA ACT GAG GCC TAT TTT GAG GCA AAA
TTT TTT AAA CCG ACG TTA CTT CTC CAC TAG CGG CTT TGA CTC CGG ATA AAA CTC CGT TTT
Lys Lys Asn Gly Cys Asn Glu Glu Val Ile Ala Glu Thr Glu Ala Tyr Asn Glu Ala Lys

          970         980         990        1000        1010        1020
CCG AAG GAG TAC TAC CAA AAT GGT ATC AAA AAA TTG GAA GGT CGT TAT AAT CGT TGT ATC
GGC TTC CTC ATG ATG GTT TTA CCA TAG TTT TTT AAC CTT CCA GCA ATA TTA GCA ACA TAG
Pro Lys Glu Tyr Tyr Gln Asn Gly Ile Lys Lys Leu Glu Gly Arg Tyr Asn Arg Cys Ile

         1030        1040
GCT CTT GAA GGG AAC TAT GTT GAA TAA
CGA GAA CTT CCC TTG ATA CAA CTT ATT
Ala Leu Glu Gly Asn Tyr Val Glu ***
```